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(54) **Connector**

Verbinder

Connecteur

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EP 1 107 381 B1

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Description

TECHNICAL FIELD

[0001] The present invention relates to an electrical connector which houses terminal fittings provided with metal lances.

BACKGROUND TO THE INVENTION

[0002] Conventionally, connectors used metal lances to retain terminal fittings. As shown in Figure 12 of this specification, this type of connector has a configuration whereby a metal lance 2 is cut out from a side wall of a terminal fitting 1, and a step 4 is formed on a side face of a cavity 3 of a housing 5. The metal lance 2 bends while the terminal fitting 1 is being inserted into the cavity 3. After the terminal fitting 1 has been pushed in to a specified position, the metal lance 2 returns to its original position and engages with the step 4, thereby preventing the removal of the terminal fitting 1.

[0003] A connector with this type of configuration is described in JP-63-257187.

[0004] The configuration using metal lances, whereby the lances serve to retain the terminal fitting against the side wall of the cavity, generally has a much greater retaining force than when plastic lances are used. Consequently, double retaining, using a retainer or the like, is not necessary. However, terminal fittings have been miniaturised in recent years, and consequently the metal lances have also become smaller. As a result, there is the danger that the retaining force of the metal lances alone may be insufficient, and it has been proposed that connectors which use metal lances should also be doubly retained by retainers.

[0005] In response to this, it was proposed that a retainer attachment hole 6 (shown by the chain line in Figure 12) be formed in a side face of the housing 5, this retainer attachment hole 6 opening into the cavity 3. A retainer provided with a fitting member is inserted from the side into the retainer attachment hole 6. After the terminal fitting 1 has been inserted into the cavity 3 and is retained therein by the metal lance 2, the retainer is pushed further inwards, and the fitting member engages with a cog member 7 of the terminal fitting 1, thereby doubly retaining the terminal fitting 1.

[0006] In the configuration described above, the means of doubly retaining the terminal fitting 1 is effective. However, problems arise when the terminal fitting 1 is to be removed from the cavity 3 for maintenance or the like. That is, when the terminal fitting 1 is to be removed, the retainer is pushed back, a jig is inserted from the anterior of the stopping stepped member 4, the metal lance 2 is bent, thereby releasing its engagement, and the terminal fitting 1 is pulled out. However, as has been explained, the retainer attachment hole 6 opens into the side wall of the cavity 3 through which the metal lance 2 passes. Consequently, there is the problem that the metal lance 2 returns to its original position at the time it passes the retainer attachment hole 6, and it catches with a hole edge thereof. As a result, the terminal fitting 1 cannot be easily removed.

[0007] The present invention has taken the above problem into consideration, and aims to present a connector wherein a terminal fitting is retained by a metal lance, and is doubly retained by a retainer.

[0008] According to the invention there is provided an electrical connector comprising a housing, a cavity in the housing and an electrical terminal insertable from a posterior side into said cavity, the terminal having a resilient lance part-sheared therefrom and engageable with a step of said cavity in order to retain the terminal from movement to the posterior side, and the housing having a jig insertion hole extending in the direction of said cavity and adapted to receive a jig for bending said lance to release engagement thereof with said step, and said housing further including an aperture opening into said cavity at the posterior side of said step, and a retainer insertable into said aperture and engageable with an abutment of said terminal to doubly retain said terminal from movement to said posterior side, characterized in that a recess is provided in said step and aligned with said jig insertion hole, said recess opening into said aperture whereby a jig may be inserted through said jig insertion hole, and said recess to the posterior side of said aperture, to bend said lance to release engagement thereof with said housing. Such an invention permits easy removal of a terminal using a single insertion jig.

[0009] Preferably the retainer is movable from a temporarily latched condition permitting free insertion of the terminal, and a fully latched condition in which the abutment of the terminal is engaged. In this arrangement the retainer preferably includes an aperture or slot to receive the release jig in the temporarily latched condition, thus reducing stroke of the retainer between the temporarily and fully latched conditions.

BRIEF DESCRIPTION OF DRAWINGS

[0010] Other features of the invention will be apparent from the following description of a preferred embodiment of the invention shown by way of example in the accompanying drawings in which:

Figure 1 is a base face view of a housing of an embodiment of the present invention.

Figure 2 is a cross-sectional view along the line X-X of Figure 1 showing the housing and a terminal fitting.

Figure 3 is a cross-sectional view along the line Y-Y of Figure 1 showing the housing.

Figure 4 is a cross-sectional view along the line Z-Z of Figure 2 showing the housing prior to the terminal

fitting being inserted.

Figure 5 is a cross-sectional view along the line X-X of Figure 1 showing the terminal fitting being inserted into a cavity.

Figure 6 is a cross-sectional view along the line X-X of Figure 1 showing the terminal fitting in a state where it has been pushed in to a correct inserting position.

Figure 7 is a cross-sectional view along the line X-X of Figure 1 showing the terminal fitting doubly retained by a retainer.

Figure 8 is a cross-sectional view along the line Y-Y of Figure 1 showing the retainer in a state whereby it has been moved to a main retaining position.

Figure 9 is a cross-sectional view along the line X-X of Figure 1 showing a jig being inserted.

Figure 10 is a cross-sectional view along the line X-X of Figure 1 showing the jig which has made contact with a posterior end face of an opening of a retainer attachment hole.

Figure 11 is a cross-sectional view along the line X-X of Figure 1 showing the terminal fitting being removed.

Figure 12 is a cross-sectional view of a prior art example.

DESCRIPTION OF PREFERRED EMBODIMENT

[0011] An embodiment of the present invention is described below with the aid of Figures 1 to 11. This embodiment shows a female connector which houses a terminal fitting provided with a metal lance.

[0012] The terminal fitting 10 will be described first. As shown in Figure 2, the terminal fitting 10 is formed from a terminal main body 11 provided with a connecting member 12 which connects with a corresponding male terminal fitting, and a cylindrical cover 13 which is attached so as to surround the connecting member 12. A barrel member 14 is formed to the posterior of the connecting member 12 of the terminal main body 11. This barrel member 14 is attached by crimping to an electric wire W. A cantilevered metal lance 15 is cut out from a lower face (relative to Figure 2) of the cover 13. The metal lance 15 has its base end at its anterior side, and is capable of bending inwards. A posterior end of the connecting member 12 of the terminal main body 11 and a posterior end of the cover 13 join at a lower face side of the terminal fitting 10 to form a cog member 16 capable of fitting with a retainer 30.

[0013] Next, a connector housing 20 (hereafter referred to simply as housing 20) will be described. As shown in Figures 1 and 2, the housing 20 has two cavities 21 aligned therein in a width-wise direction. The terminal fittings 10 are inserted from the posterior into these cavities 21. A plurality of upper and lower steps are provided within the cavities 21. Only the lowermost step will be described below. A retainer attachment hole 22, to which the retainer 30 can be attached, is formed in the housing 20 at an approximately central location relative to the length-wise direction of the cavity 21. This retainer attachment hole 22 intersects with the cavity 21 in an up-down direction relative to Figure 2. The retainer attachment hole 22 forms an opening 23 of a specified length in a lower face of the housing 20.

[0014] As shown in Figure 5, when the terminal fitting 10 is inserted into the cavity 21, the metal lance 15 thereof makes contact with a base face 21 A of the cavity 21 and bends. When the metal lance 15 passes the opening 23 of the retainer attachment hole 22 it returns to its original position, and then it is again bent by a stopping wall 24 provided at an anterior side of the retainer attachment hole 22. When the metal lance 15 reaches a bending space 25 at the anterior of the stopping wall 24, it again returns to its original position, and is retained by the stopping wall 24 (see Figure 6). The depth to which the terminal fitting 10 has been inserted when the metal lance 15 is retained by the stopping wall 24 is the correct inserting position of the terminal fitting 10. An opening is formed in an anterior end portion of the housing 20 at a location to the anterior of the bending space 25, this forming a jig insertion hole 26 into which a jig 50 is inserted to bend the metal lance 15.

[0015] The retainer attachment hole 22 (both side edges of the opening 23 thereof are shown in Figure 1) passes through to an upper face of the housing 20 (as shown in Figure 3). Protrusions 27 are formed in side grooves of the retainer attachment hole 22, on mutually opposing anterior and posterior walls. The anterior protrusion 27 is formed at a higher location, relative to Figure 3, and the posterior protrusion 27 is formed at a lower location. Side plates 35 of the retainer 30 are inserted into these side grooves, and stopping claws 36 and 37 of the side plates 35 catch with these two protrusions, thereby maintaining the position of the retainer 30 in both up and down directions. The side grooves are formed by cutting away side walls of exterior sides of the cavity 21.

[0016] As shown in Figures 1 and 2, the retainer 30 is approximately C-shaped and is provided with a main body 31 which, as shown in Figure 2, is inserted upwards into the opening 23 of the retainer attachment hole 22. A base plate 32 which fits with the opening 23 of the retainer attachment hole 22 is formed at a lower end of the main body 31.

[0017] The main body 31 is provided with anterior plates 33 which extend along the width-wise direction of the housing 20 and are provided directly to the posterior of the stopping wall 24 within the retainer attachment

hole 22. Holes provided in these anterior plates 33 join with the cavity 21, the terminal fitting 10 being capable of passing through these holes. A fitting member 34 which fits with the cog member 16 of the terminal fitting 10 is provided below the holes.

[0018] As shown in Figure 3, the side plates 35 provided on both side edges of the pair of anterior plates 33 of the main body 31 are inserted into the grooves at the sides of the retainer attachment hole 22. The main stopping claw 36 and the temporary stopping claw 37 are provided to the anterior and the posterior respectively on upper edges of the side plates 35. These stopping claws 36 and 37 fit with the protrusions 27 of the housing 20.

[0019] As shown in Figure 3, when the posteriorly located temporary stopping claw 37 fits with the protrusion 27, the base plate 32 of the retainer 30 protrudes from the lower face of the housing 20. At this juncture, as shown in Figure 2, an upper face of the fitting member 34 is positioned so as to form an approximately unified face with an upper face of the stopping wall 24 which is located to its anterior. This allows the terminal fitting 10 to be inserted into the cavity 21, and the metal lance 15 engages with these upper faces as this insertion progresses, thereby causing the metal lance 15 to bend. At this juncture, the retainer 30 is in a temporary retaining position.

[0020] As shown in Figure 8, after the anteriorly located main stopping claw 36 has risen over the protrusion 27, it fits therewith, and the lower face of the base plate 32 of the retainer 30 forms an approximately unified face with the lower face of the housing 20. At this juncture, as shown in Figure 7, the fitting member 34 enters upwards into the cavity 21 and fits immediately to the posterior of the cog member 16 of the terminal fitting 10. Now the retainer 30 is in the main retaining position.

[0021] As shown in Figure 4, a through hole 40 is provided in the stopping wall 24 of the housing 20, at a central location in a width-wise direction thereof. The jig 50 which has passed via the jig insertion hole 26 into the cavity 21 passes through this through hole 40. The through hole 40 passes through the stopping wall 24 from the anterior to the posterior thereof. The dimensions of the through hole 40 correspond to the width of the jig 50, and the jig 50 is inserted therethrough into the retainer insertion hole 22 at the posterior of the stopping wall 24.

[0022] A joining hole 41 is provided in the fitting member 34 of the retainer 30, at a central portion in a width-wise direction thereof. This joining hole 41 joins with the through hole 40 of the stopping wall 24 which is located at its anterior side. The joining hole 41 has approximately the same dimensions as the through hole 40, and passes through the fitting member 34 from the anterior to the posterior thereof. The jig 50 passes through the joining hole 41 from the through hole 40. As shown in Figure 10, the jig 50, which has passed through the joining hole 41, is inserted to a depth whereby it makes contact with a posterior end face 23A of the opening 23 of the retainer attachment hole 22. An upper face 50A of the jig 50 forms an approximately unified face with the base face 21A of the cavity 21. When the jig 50 is in a state whereby it makes contact with the posterior end face 23A of the opening 23, the upper face 50A of the jig 50 and the base face 21 A of the cavity 21 form a flat face along the entirety of the base face side of the cavity 21.

[0023] The present embodiment is configured as described above. Next, the operation thereof will be described. As shown in Figure 1, after the retainer 30 has been attached to the housing 20 in the temporary retaining position, the terminal fitting 10 is inserted into the cavity 21. As shown in Figure 6, pushing the terminal fitting 10 in to the correct inserting position causes the metal lance 15 to be retained by the stopping wall 24. The terminal fitting 10 is then in a first retained state.

[0024] Next, as shown in Figure 7, the retainer 30, which is in the temporary retaining position, is pushed upwards into the main retaining position. The fitting member 34, which moves upwards as the retainer 30 moves, fits directly to the posterior of the cog member 16 of the terminal fitting 10. By this means, the terminal fitting 10 is in a doubly retained state. That is, it is doubly retained within the housing 20.

[0025] The terminal fitting 10 may need to be removed from the housing 20 for maintenance or the like. In such a situation, the retainer 30 is moved to the temporary retaining position and the doubly retained state provided by the fitting member 34 is released. Then, as shown in Figure 9, the jig 50 is inserted via the jig insertion hole 26 at the anterior end face of the housing 20. The jig 50 is inserted from the anterior and makes contact with the metal lance 15 which is retained by the stopping wall 24. The metal lance 15 is thereby bent inwards, and is released from its retained state with the stopping wall 24.

[0026] Next, the jig 50 is pushed further inwards. After the jig 50 has passed through the through hole 40 provided in the stopping wall 24, it passes through the joining hole 41 which is provided immediately to the posterior of the through hole 40, and which is provided in the fitting member 34 of the retainer 30. The jig 50, which has passed through the joining hole 41, is inserted into the retainer attachment hole 22 and makes contact with the posterior end face 23A of the opening 23 of this retainer attachment hole 22. As shown in Figure 10, the insertion operation of the jig 50 is now complete. Then the electric wire W is pulled, and the terminal fitting 10 is thereby removed from the cavity 21.

[0027] As shown in Figure 11, the terminal fitting 10 is removed while the metal lance 15 is kept bent by the jig 50. After a posterior end of the metal lance 15 has passed the posterior end face 23 of the retainer attachment hole 22, the terminal fitting 10 is removed while the metal lance 15 is kept bent by the base face 21A of the cavity 21.

[0028] That is, the base face 21 A of the cavity 21 and

the upper face 50A of the jig 50 form a joining flat face which extends without any steps along the entirety of the base face side of the cavity 21. Consequently, as the terminal fitting 10 is being removed, the metal lance 15 thereof remains in a bent state until it is removed from the cavity 21. As a result, the lance 15 does not catch with anything during its removal from the cavity 21, and the terminal fitting 10 is removed smoothly. Moreover, the jig 50 is inserted in one single operation, thus improving operability.

[0029] Furthermore, the retainer 30 is provided with the joining hole 41 which connects to the through hole 40 of the stopping wall 24. Consequently, when the retainer 30 is in the temporary retaining position, the fitting member 34 thereof is provided in a location which has a similar height to the terminal fitting 10 and, as a result, the stroke between the temporary retaining position and the main retaining position of the retainer 30 is decreased by the height of this joining hole 41. Consequently, the operability of the retainer 30 improves.

[0030] The present invention is not limited to the embodiments described above with the aid of figures. For example, the possibilities described below also lie within the technical range of the present invention. In addition, the present invention may be embodied in various other ways without deviating from the scope thereof.

(1) In the embodiment described above, the tip of the jig makes contact with the hole edge at the posterior of the retainer attachment hole. However, a groove may equally well be provided to the posterior of the retainer attachment hole, and the jig inserted more deeply therein. In that case, the inserting position of the jig would be stabilized due to the jig fitting with this groove. Moreover, the groove could pass through to a posterior edge of the housing.

(2) In the embodiment described above, the joining hole is provided in the fitting member of the retainer. However, according to the present invention, if the fitting member of the retainer is at a location distant from the location of the through hole of the stopping wall at the time when the retainer is in the temporary retaining position, no joining hole need be provided.

(3) The present invention is not limited to a female connector. It is also suitable for a male connector.

Claims

1. An electrical connector comprising a housing (20), a cavity (21) in the housing (20) and an electrical terminal (10) insertable from a posterior side into said cavity (21), the terminal (10) having a resilient lance (15) part-sheared therefrom and engageable with a step (24) of said cavity (21) in order to retain the terminal (10) from movement to the posterior side, and the housing (20) having a jig insertion hole (26) extending in the direction of said cavity (21) and adapted to receive a jig for bending said lance (15) to release engagement thereof with said step (24), and said housing (20) further including an aperture (23) opening into said cavity (21) at the posterior side of said step (24), and a retainer (30) insertable into said aperture (23) and engageable with an abutment (16) of said terminal (10) to doubly retain said terminal (10) from movement to said posterior side, **characterized in that** a recess (40) is provided in said step (24) and aligned with said jig insertion hole (26), said recess (40) opening into said aperture (23) whereby a jig is insertable through said jig insertion hole (26), and said recess (40) to the posterior side of said aperture, to bend said lance (15) to release engagement thereof with said housing (20).

2. A connector according to claim 1 wherein said recess (40) is a slot.

3. A connector according to claim 1 or claim 2 wherein said retainer (30) is movable from a temporary condition permitting free passage of said terminal (10) into said cavity (21) to a final condition in which said retainer (30) and abutment (16) are engaged, said retainer having a channel (41) adapted to receive a jig and aligned with said recess (40) when in said temporary condition.

4. A connector according to any preceding claim wherein said recess (40) extends on the posterior side of said aperture (23).

Patentansprüche

1. Elektrischer Verbinder, umfassend ein Gehäuse (20), einen Hohlraum (21) in dem Gehäuse (20) und einen elektrischen Anschluß bzw. Kontakt (10), welcher von einer rückwärtigen bzw. Rückseite in den Hohlraum (21) einsetzbar ist, wobei der Anschluß (10) eine rückstellfähige Lanze bzw. Arm (15) aufweist, welche teilweise geschert bzw. abgeschnitten bzw. als Teil geschnitten ist und mit einer Stufe (24) des Hohlraums (21) in Eingriff bringbar ist, um den Anschluß (10) vor einer Bewegung zu der rückwärtigen Seite zurückzuhalten, und wobei das Gehäuse (20) ein Werkzeug bzw. Betätigungselement-Einsetzloch (26) aufweist, welches sich in der Richtung des Hohlraums (21) erstreckt und adaptiert ist, ein Betätigungselement bzw. Werkzeug zum Biegen der Lanze (15) aufzunehmen, um einen Eingriff davon mit der Stufe (24) zu lösen bzw. freizugeben, und wobei das Gehäuse (20) weiters eine Öffnung (23) beinhaltet, welche in den Hohlraum (21) an der rückwärtigen Seite der Stufe (24) öffnet

bzw. mündet, und eine Halte- bzw. Rückhalteeinrichtung (30), welche in die Öffnung (23) einsetzbar ist und mit einem Anschlag (16) des Anschlusses (10) in Eingriff bringbar ist, um den Anschluß (10) doppelt vor einer Bewegung zu der rückwärtigen Seite zurückzuhalten, **dadurch gekennzeichnet, daß** eine Vertiefung bzw. Aussparung (40) in der Stufe (24) vorgesehen ist und mit dem Betätigungselement-Einsetzloch (26) ausgerichtet ist, wobei die Vertiefung (40) in die Öffnung (23) mündet, wodurch ein Betätigungselement durch das Betätigungselement-Einsetzloch (26) und die Vertiefung (40) zu der rückwärtigen Seite der Öffnung einsetzbar ist, um die Lanze (15) zu biegen, um einen Eingriff davon mit dem Gehäuse (20) freizugeben.

2. Verbinder nach Anspruch 1, wobei die Vertiefung (40) ein Schlitz bzw. Nut ist.

3. Verbinder nach Anspruch 1 oder Anspruch 2, wobei die Rückhalteeinrichtung (30) von einem vorübergehenden Zustand, welcher einen freien Durchtritt des Anschlusses (10) in den Hohlraum (21) erlaubt, zu einem abschließenden Zustand bewegbar ist, in welchem die Rückhalteeinrichtung (30) und ein Anschlag (16) in Eingriff stehen, wobei die Rückhalteeinrichtung einen Kanal (41) aufweist, welcher adaptiert ist, ein Betätigungselement aufzunehmen, und mit der Vertiefung (40) ausgerichtet ist, wenn sie sich in dem vorübergehenden Zustand befindet.

4. Verbinder nach einem vorangehenden Anspruch, wobei sich die Vertiefung (40) an der rückwärtigen Seite der Öffnung (23) erstreckt.

Revendications

1. Connecteur électrique comprenant un boîtier (20), une cavité (21) dans le boîtier (20) et une borne électrique (10) insérable par un côté postérieur dans la dite cavité (21), la borne (10) comportant une languette élastique (15) partiellement découpée dans la borne et qui peut venir en prise avec un épaulement (24) de la dite cavité (21) afin de retenir la borne (10) contre un mouvement vers le côté postérieur, le boîtier (20) comportant un trou d'insertion d'outil (26) qui s'étend dans la direction de la dite cavité (21) et peut recevoir un outil pour replier la dite languette (15) afin de la libérer de son engagement avec le dit épaulement (24), et le dit boîtier (20) comportant en outre une ouverture (23) qui débouche dans la dite cavité (21) du côté postérieur du dit épaulement (24), et une pièce de retenue (30) peut être insérée dans la dite ouverture (23) et venir en prise avec une butée (16) de la dite borne (10) afin de retenir doublement la dite borne (10) contre un mouvement vers le dit côté postérieur, **caractérisé en ce qu'**un évidement (40) est prévu dans le dit épaulement (24) et aligné avec le dit trou d'insertion d'outil (26), le dit évidement (40) débouchant dans la dite ouverture (23) de sorte qu'un outil peut être inséré à travers le dit trou d'insertion d'outil (26) et le dit évidement (40) vers le côté postérieur de la dite ouverture, pour replier la dite languette (15) afin de la libérer de son engagement avec le dit boîtier (20).

2. Connecteur selon la revendication 1, dans lequel le dit évidement (40) est une fente.

3. Connecteur selon la revendication 1 ou la revendication 2, dans lequel la dite pièce de retenue (30) est déplaçable d'un état temporaire, permettant le libre passage de la dite borne (10) vers la dite cavité (21), à un état final dans lequel la dite pièce de retenue (30) et la dite butée (16) sont en prise, la dite pièce de retenue comportant une rainure (41) prévue pour recevoir un outil et alignée avec le dit évidement (40) lorsque la pièce de retenue est dans le dit état temporaire.

4. Connecteur selon une quelconque des revendications précédentes, dans lequel le dit évidement (40) s'étend sur le côté postérieur de la dite ouverture (23).

Fig1

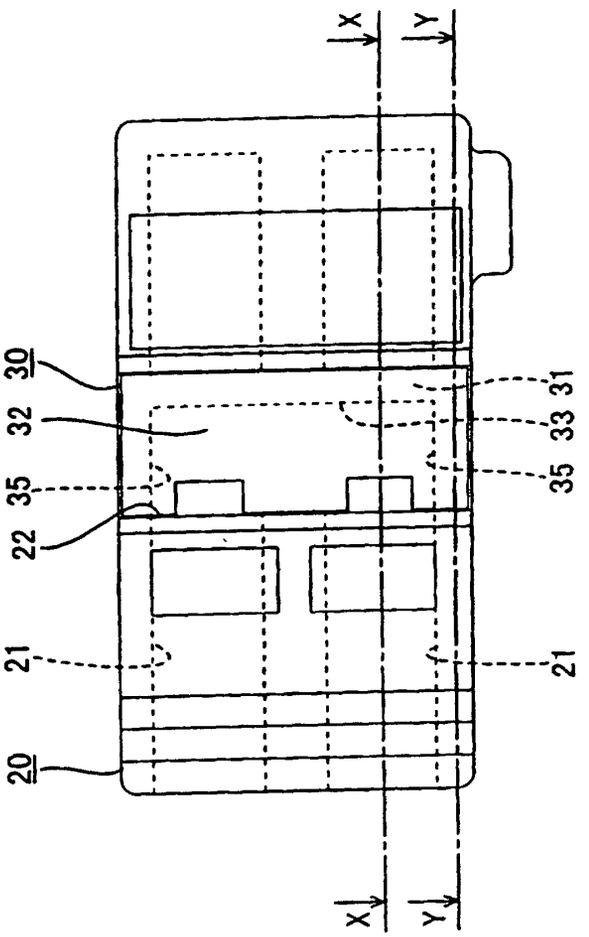
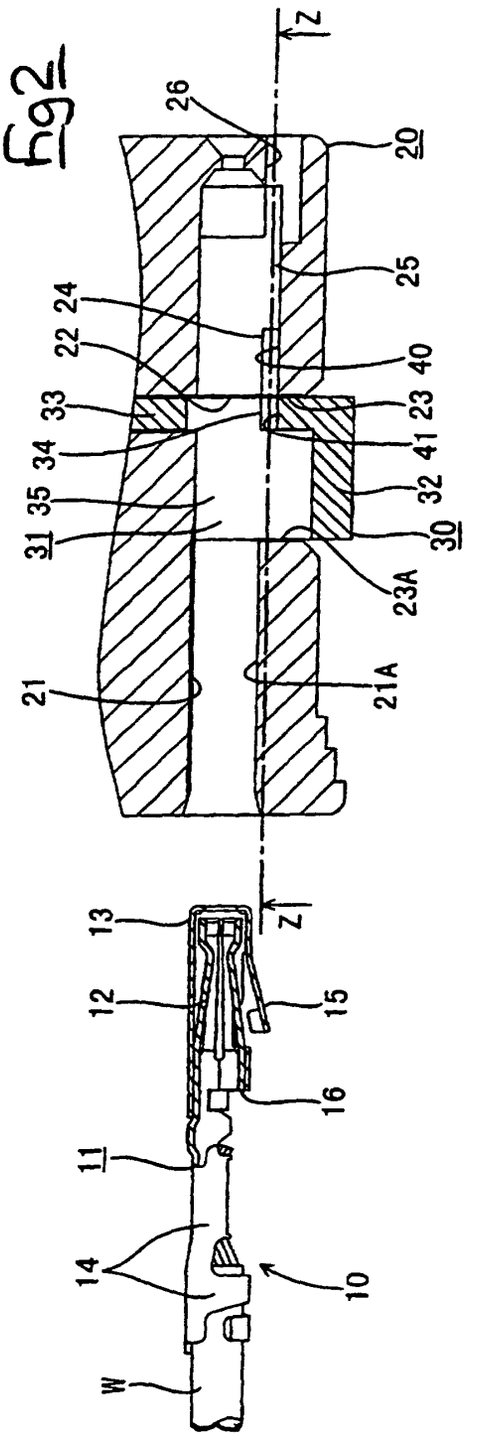

X
Y
30
32
35
22
21
20
31
33
35
21
X
Y

Fig2


Z
26
20
25
24
22
40
33
23
34
41
35
32
31
30
23A
21
21A
Z
13
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15
16
11
14
10
W

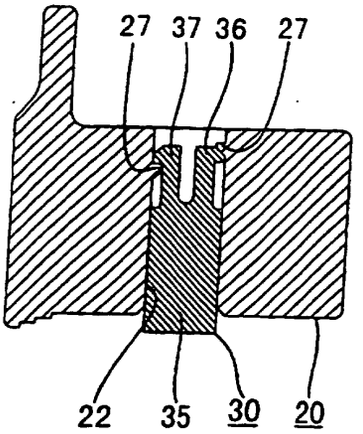


Fig3

Fig4

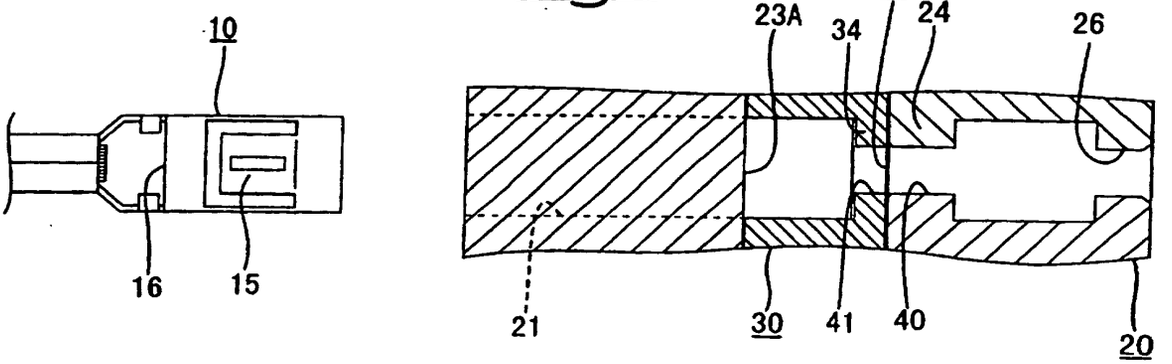
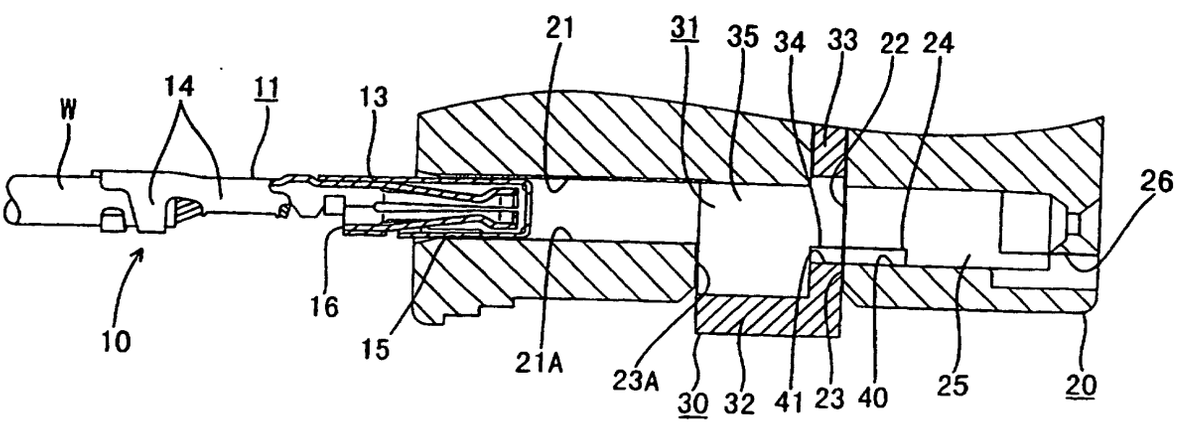


Fig5



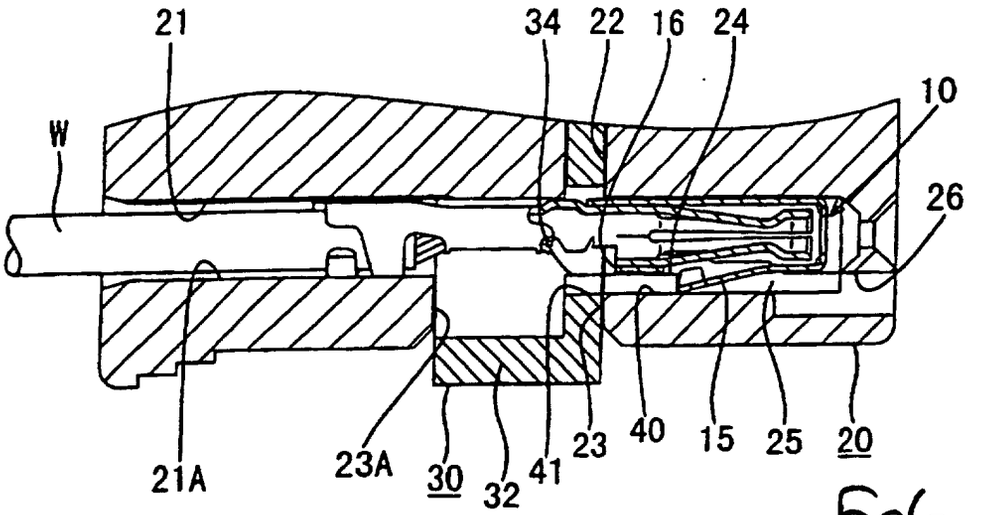


Fig6

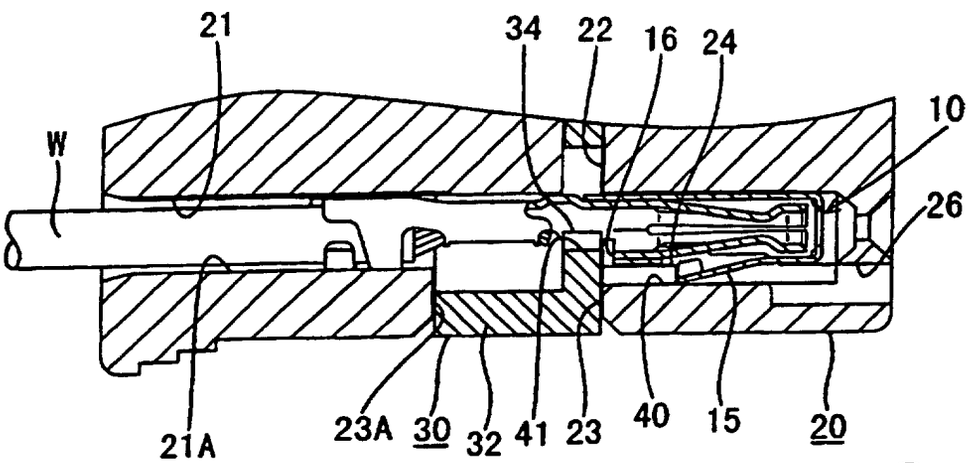


Fig7

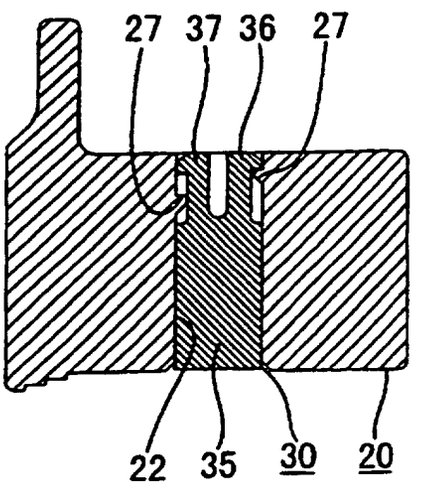


Fig8

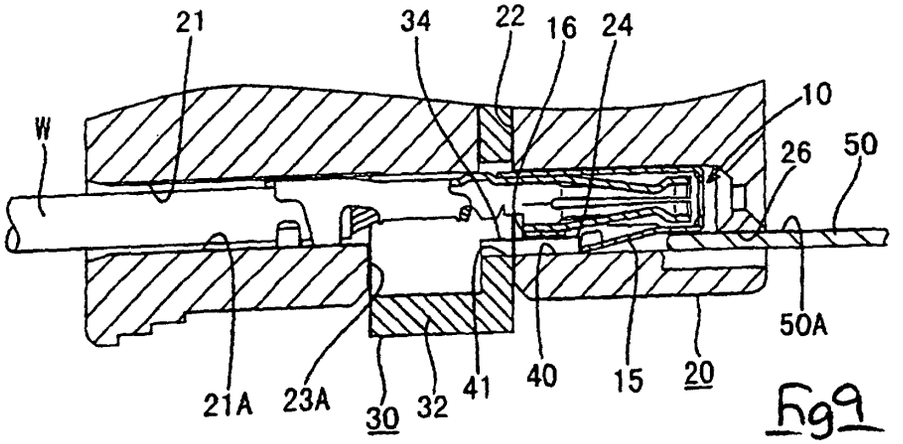


Fig9

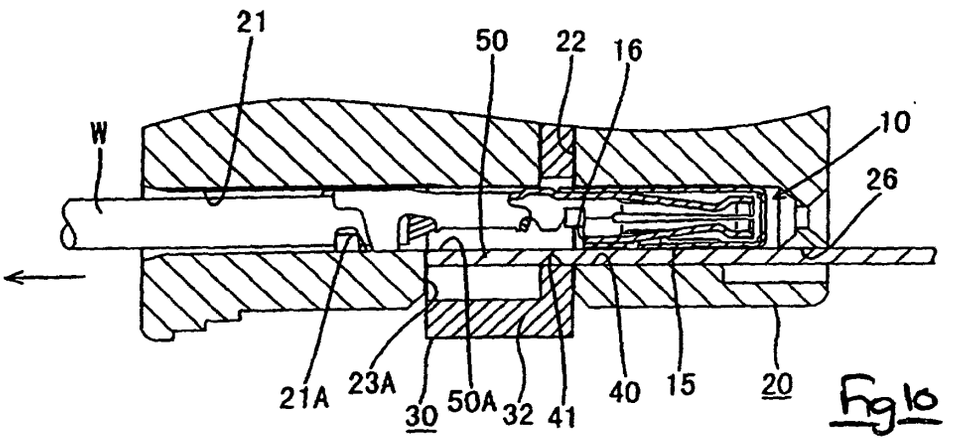


Fig10

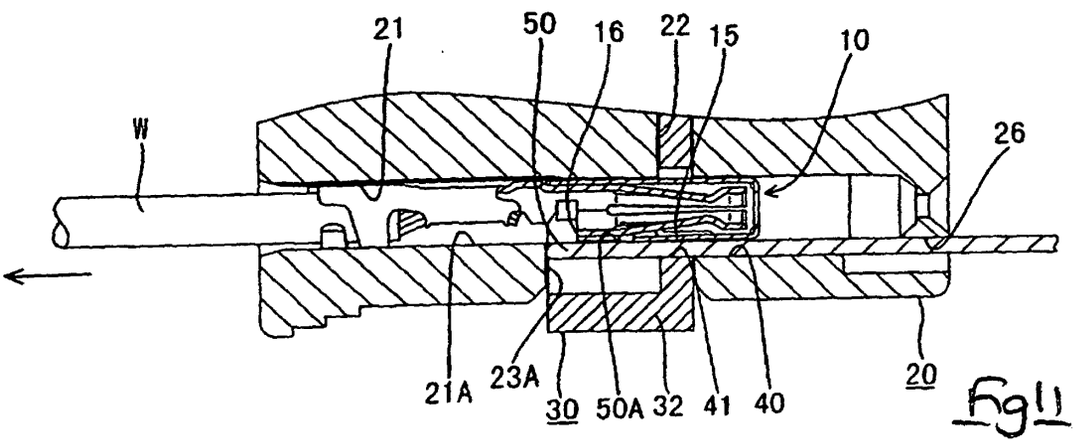


Fig11

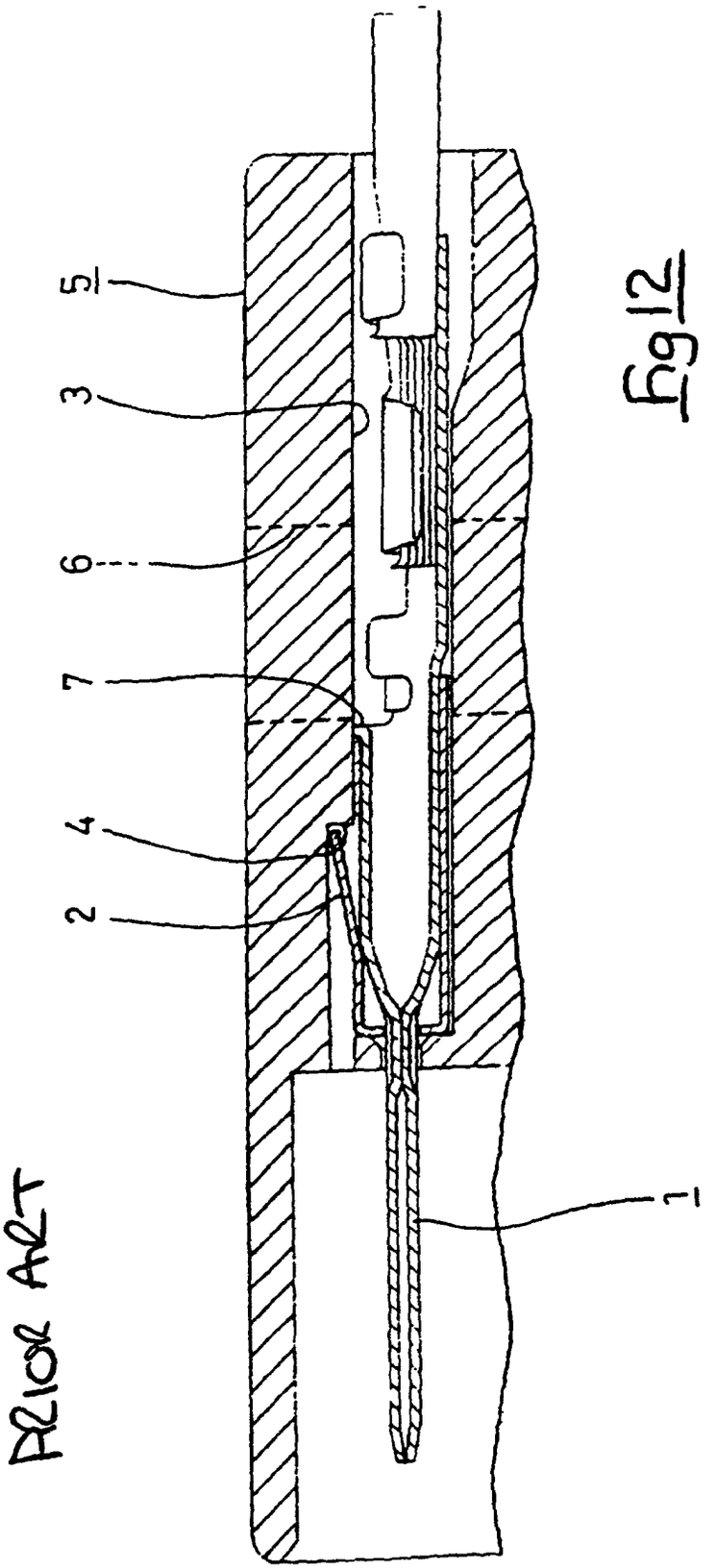


Fig 12

PRIOR ART